

REMARKS

The Office action of June 2, 2006 has been carefully considered, and applicants respectfully request reconsideration.

Claims 1-13 are present in the application.

Claims 1-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Kronfli et al. (GB Patent 2 309 701) in view of Coowar et al. (U.S. Patent Application Publication 2003/0170545).

Claims 1-4 and 6-8 stand rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Coowar et al.

Claims 9-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Coowar et al.

The present invention relates to making a porous polymeric membrane, using a mixture of a solvent and a non-solvent. This also is the subject of Coowar et al., the main difference being that Coowar adds the solvent before the non-solvent, whereas the present invention adds the solvent after the non-solvent, i.e., "dispersing the polymer in the non-solvent prior to addition of the solvent...." Applicants' previous response describes the unexpected advantages of changing the order of addition of solvent and non-solvent.

Kronfli et al does not describe making porous polymeric membranes from a solvent/non-solvent mixture, but does describe a

polymer solution made by adding solvent after non-solvent (page 11 lines 11-14), which is the order of addition of the present invention. Importantly however, Kronfli does not describe casting that solution - as defined in parent claim 1 and dependent claims 2-13.. Rather, Kronfli et al. describe adding other materials, including insoluble graphite, to convert the solution into a slurry. They then cast the slurry, not the solution, to obtain a composite graphite electrode, which is most definitely not a porous polymeric membrane as produced by the method of the present invention.

The teaching of Kronfli et al. is therefore absent any indication whatever to the skilled reader that the solution they made in Example 3 should be cast to produce controlled porosity polymeric membranes.

Coowar teaches the skilled reader to make porous polymeric membranes from solvent/non-solvent mixtures, as stated above, by adding solvent before non-solvent. He indicates no value or incentive, read alone or with Kronfli et al. to reverse the order of addition thereby to achieve the unexpected and surprising benefits applicants have previously indicated.

Specific

The Examiner has made a number of detailed points which applicants shall comment upon in turn identified by the numbered sections in the Office action. Applicants submit that none of the

Examiner's points destroy the generality of the case for patentability set out above.

Paragraphs 9 and 10:

Page 7 lines 6-16 of Kronfli et al. describes dissolving a polymer (a polyvinylidene fluoride, or PVdF, graft co-polymer) in dimethyl acetamide (DMA) which is a solvent. Then, ethylene carbonate, which is also a solvent (page 4 lines 29-31), and acetone described on page 7 line 16 as a casting solvent, are added. Also present are a lithium salt (LiClO₄) and a plasticizer (tetraglyme). The section in Kronfli et al. referred to does not therefore describe use of a non-solvent and is not therefore relevant to the present invention.

Further, this section of Kronfli et al. does not describe casting from solution. Graphite, an insoluble solid material, is added to give a slurry which is then cast to give a composite electrode, not a porous polymeric membrane.

Paragraphs 11 and 12:

The Examiner's arguments are difficult to follow. Reference to "dried in a vacuum oven for 24 hours at 50 degrees C" is at page 6 lines 18-19. No non-solvent or solvent in the sense of the present invention are used; "dried" clearly refers to removal of deionised water used to wash the copolymer powder (page 6 lines 16-18). No solution of polymer material is involved.

Reference to "left in a dry room for 5 days for the coating solvent (the DMA) to evaporate" (page 6 lines 32-34) is likewise nothing to do with solvation. The words make clear that the solvent (DMA) is removed by the described procedure. It is also noted that a non-solvent is not used in page 6 lines 26-34 of Kronfli *et al.*

With regard to the criticality of solvation, an object of the present invention is to achieve pores of a substantially uniform size and to control membrane porosity. This is not possible with a heterogeneous mixture. Hence, it is necessary to provide a homogeneous solution as stated on page 4 lines 25-27 of the present specification. Complete solvation does not concern Kronfli *et al.* since they are making composite electrodes, not porous polymer membranes, and have no interest in controlled porosity.

The determination of complete solvation is within the ability of the ordinary skilled person in the art. For example, such a person may make periodic viscosity measurements and establish that complete solvation has occurred when the viscosity ceases to change between successive measurements. Alternatively, or additionally, one may invoke light scattering methods. Such methods are known in the art.

The only relevant part of Kronfli *et al.* is Example 3 because, as stated previously, it describes dispersing in a non-

solvent (methanol) followed by addition of a solvent (NMP and DMA). Clearly, Kronfli et al., in contrast to the present invention, are not producing a porous polymer membrane because they describe, in Example 3, adding an insoluble, inorganic material to give a slurry (page 11 line 17), which also contains LiClO₄, which they cast to give a composite graphite electrode. Thus, Kronfli et al. do not cast the solution they obtain in Example 3. Rather, they add other materials to it to make it into a slurry and then cast. By adding additional materials such as graphite, it is impossible for them to obtain a polymeric membrane.

It is therefore not true for the Examiner to conclude that the sequence of processing steps is the same in Kronfli et al. as in the present invention.

Paragraphs 13 and 14:

The point applicants are making with reference to Kronfli et al.'s description of the use of methanol is that they do not say how much methanol is used: the term "small amount" is inexact. Even if "small amount" were regarded as reading on "2 to 30 wt%", as in the present invention, as claimed, it would not detract from the force of arguments in favor of patentability as presented above.

Paragraphs 15 and 16:

Applicants do not dispute that the references are related. What is disputed is that reading them together would render the present claims obvious. The reasons for this are given above in the general section and need not be repeated.

Paragraph 17:

The Examiner's point, again, does not detract from the general case for patentability. The important feature in the present claims is the order of addition of solvent and non-solvent to give a solution which is then cast.

Paragraph 18:

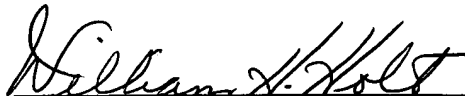
At risk of repetition, Kronfli et al., although they use the same order of addition in Example 3 as in the present claims, they do not cast from solution.

In view of the foregoing explanations of the differences between applicants' claims 1-13 and the cited prior art, reconsideration is requested and allowance of claims 1-13 is courteously solicited.

Respectfully submitted,

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I hereby certify that this correspondence is being transmitted by facsimile this day to Examiner Michael Bernshteyn at the United States Patent and Trademark Office, Art Unit 1713, to fax No. 571-273-8300.

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